System Board D2440/D2932 for RX330 S1

Technical Manual

Edition June 2009

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Certified documentation according to DIN EN ISO 9001:2000

To ensure a consistently high quality standard and user-friendliness, this documentation was created to meet the regulations of a quality management system which complies with the requirements of the standard DIN EN ISO 9001:2000.

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1 Introduction

This technical manual describes the system boards D2440/D2932, which can be equipped with one or two AMD® processors.

Further information about drivers is provided in the readme files on the hard disk, on the supplied CDs or DVDs.

You will find further information in the BIOS description.

Notational conventions

The meanings of the symbols and fonts used in this manual are as follows:

italics	indicates commands, menu items, file and path names or software programs
`fixed font`	indicate system output on the monitor
`semi-bold fixed font`	indicates values to be entered through the keyboard
Key symbol	indicates keys according to their representation on the keyboard If capital letters are to be entered explicitly, then the Shift key is shown, e.g. SHIFT - A for A. If two keys need to be pressed at the same time, then this is shown by placing a hyphen between the two key symbols.
“quotation marks”	indicates names and terms that are being emphasized.
►	indicates an operation that to be performed
CAUTION!	indicates warnings, which, if ignored, will endanger your health, destroy the system or lead to the loss of data.
	indicates additional information, notes and tips

Table 1: Notational conventions

2 Important notes

In this chapter you will find essential information regarding safety when working with your server.

CAUTION!

With the system board installed you must open the system to access the system board. How to access the system board of your system is described in the appropriate service supplement.

When handling the system board, refer to the specific notes on safety in the operating manual and/or service supplement for the respective server.

2.1 Notes on safety

CAUTION!

- The actions described in these instructions should only be performed by authorized, qualified personnel. Equipment repairs should only be performed by qualified staff. Any failure to observe the guidelines in this manual, and any unauthorized openings and improper repairs could expose the user to risks (electric shock, fire hazards) and could also damage the equipment. Please note that any unauthorized openings of the device will result in the invalidation of the warranty and exclusion from all liability.
- Transport the device only in the antistatic original packaging or in packaging that protects it from knocks and jolts.
- Only install expansions that are allowed for the system board. If you install other expansions, you may damage the requirements and rules governing safety and electromagnetic compatibility or your system. Information on which system expansions are suitable can be obtained from the customer service centre or your sales outlet.
- The warranty expires if the device is damaged during the installation or replacement of system expansions.

- Components can become very hot during operation. Ensure you do not touch components when making extensions to the system board. There is a danger of burns!
- Transmission lines to peripheral devices must be adequately shielded.
- To the LAN wiring the requirements apply in accordance with the standards EN 50173 and EN 50174-1/2. As minimum requirement the use of a protected LAN line of category 5 for 10/100 MBps Ethernet, and/or of category 5e for Gigabit Ethernet is considered. The requirements of the specification ISO/IEC 11801 are to be considered.
- Never connect or disconnect data transmission lines during a storm (lightning hazard).

Batteries

CAUTION!

- Incorrect replacement of lithium battery may lead to a risk of explosion. The batteries may only be replaced with identical batteries or with a type recommended by the manufacturer.

  It is essential to observe the instructions in chapter “Replacing the lithium battery”.

Modules with electrostatic-sensitive components

Systems and components that might be damaged by electrostatic discharge (ESD) are marked with the following label:

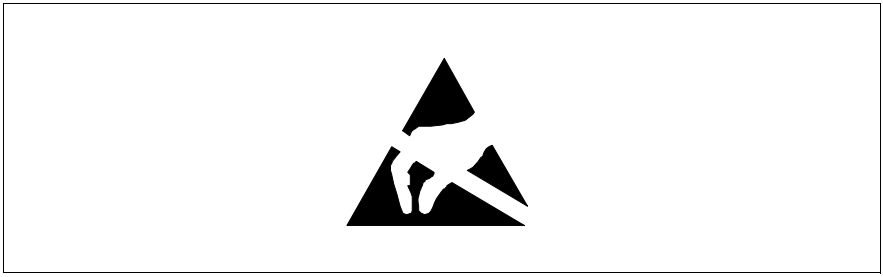

Figure 1: ESD label

When you handle components fitted with ESDs, you must observe the following points under all circumstances:

- You must always discharge yourself of static charges (e.g. by touching a grounded object) before working.
- The equipment and tools you use must be free of static charges.
- Remove the power plug from the power socket before inserting or removing boards containing ESDs.
- Always hold boards with ESDs by their edges.
- Never touch pins or conductors on boards fitted with ESDs.
- Use a grounding cable designed for this purpose to connect yourself to the system unit as you install/remove the board.
- Place all components on a static-safe base.

i You will find a detailed description for handling ESD components in the relevant European or international standards (EN 61340-5-1, ANSI/ESD S20.20).

Notes about boards

- During installation/deinstallation of the system board, observe the specific instructions described in the service manual for the server.
- Remove the plug from the mains outlet so that system and system board are totally disconnected from the mains voltage.
- To prevent damage to the system board, the components and conductors on it, please take great care when you insert or remove boards. Take great care to ensure that extension boards are slotted in straight, without damaging components or conductors on the system board, or any other components, for example EMI spring contacts
- Be careful with the locking mechanisms (catches, centring pins etc.) when you replace the system board or components on it, for example memory modules or processors.
- Never use sharp objects (screwdrivers) for leverage.

2.2 CE certificate

CE

The shipped version of this board complies with the requirements of the EEC directive 89/336/EEC „Electromagnetic compatibility“.

Compliance was tested in a typical PRIMERGY configuration.

2.3 Environmental protection

Environmentally friendly product design and development

This product has been designed in accordance with standards for ”environmentally friendly product design and development“. This means that the designers have taken into account important criteria such as durability, selection of materials and coding, emissions, packaging, the ease with which the product can be dismantled and the extent to which it can be recycled.

This saves resources and thus reduces the harm done to the environment.

Notes on saving energy

Devices that do not have to be on permanently should not be switched on until they need to be used and should be switched off during long breaks and on completion of work.

Notes on packaging

Please do not throw away the packaging. We recommend that you do not throw away the original packaging in case you need it later for transporting.

Notes on dealing with consumables

Please dispose batteries in accordance with local government regulations.

Do not throw batteries and accumulators into the household waste. They must be disposed of in accordance with local regulations concerning special waste.

All batteries containing pollutants are marked with a symbol (a crossed-out rubbish bin on wheels). In addition, the marking is provided with the chemical symbol of the heavy metal decisive for the classification as a pollutant:

Cd Cadmium
Hg Mercury
Pb Lead

Notes on labeling plastic housing parts

Please avoid attaching your own labels to plastic housing parts wherever possible, since this makes it difficult to recycle them.

Returning, recycling and disposal

The device may not be disposed of with household rubbish. This appliance is labelled in accordance with European Directive 2002/96/EC concerning used electrical and electronic appliances (waste electrical and electronic equipment - WEEE).
The guideline determines the framework for the return and recycling of used appliances as applicable throughout the EU. To return your used device, please use the return and collection systems available to you. You will find further information on this at *http://ts.fujitsu.com/recycling*.

For details on returning and reuse of devices and consumables within Europe, refer to the “Returning used devices” manual, or contact your Fujitsu Technology Solutions branch office/subsidiary or our recycling centre in Paderborn:

Fujitsu Technology Solutions
Recycling Center
D-33106 Paderborn

Tel. +49 5251 8 18010

Fax +49 5251 8 18015

3 Features

For the PRIMERGY RX330 S1 server the system boards D2440 and D2932 are available. The system boards differ in Firmware, processors and main memory.

3.1 Overview

Processors

D2440	D2932
– 2 x AMD64® Opteron™ Dual Core or Quad Core („Barcelona“) processors – 2 processor sockets F (1207) – integrated Memory Controller – AMD PowerNow!™ Technology with Optimized Power Management (OPM)	– 2 x Opteron™ Quad Core („Shanghai“) processors – 2 processor sockets F (1207) – integrated Memory Controller – AMD PowerNow!™ Technology with Optimized Power Management (OPM)

Main memory

D2440	D2932
– 8 slots for main memory ECC DDR2-533 (PC4300) or ECC DDR2-667 (PC5300) SDRAM memory modules with 512 MB, 1Gbyte, 2 Gbyte and 4Gbyte – maximum 32 Gbyte of memory – ECC multiple bit error detection	– 8 slots for main memory ECC DDR2-800 (PC6400) SDRAM memory modules with 1 Gbyte, 2 Gbyte and 4Gbyte – maximum 32 Gbyte of memory – ECC multiple bit error detection

Chip sets on the system board

– HT1000 (South bridge)
– HT2100 (North bridge)
– LSI 1068 SAS RAID controller
– iRMC with integrated graphic controller

– Broadcom 5715 Dual Gbit LAN controller
– Onboard Super I/O controller PC87417

Internal connectors

– IDE primary connector
– 6 SAS connectors
– SATA connector
– USB connector
– front panel connector
– ATX power connector
– 2 CPU(12V) power connectors
– fan1-3 Sys connector
– I^2C connector (PSU)
– 2 hard disk signaling connectors
– IDTEMP connector
– safety switch connector
– battery holder

External connectors

– 2 serial ports (COM1, COM2)
– 2 PS/2 interfaces for keyboard and mouse
– 2 USB 2.0 ports
– VGA port
– 2 RJ45 LAN ports
– Service LAN port

PCI slots

– slot for riser card
– PCI Express x8 slot

BIOS features

– Phoenix-BIOS (Trusted Core)

Form factor

304.8 mm x 330.2 mm

3.2 Main memory

The system board supports up to 32 Gbyte main memory. 8 slots (4 banks with 2 modules) are available for the main memory. Each memory bank can be populated with 512 Mbyte (only D2440), 1 Gbyte, 2 Gbyte or 4 Gbyte ECC DDR2 SDRAM memory modules.The maximum main memory is 16 Gbyte for installation with one CPU and 32 GByte with two CPUs.

D2440	ECC DDR2-533 (PC4300) or ECC DDR2-667 (PC5300)
D2932	ECC DDR2-800 (PC6400)

ECC with memory scrubbing is supported.

You will find the descriptions how to install memory modules in the Options Guide of your server.

Module population

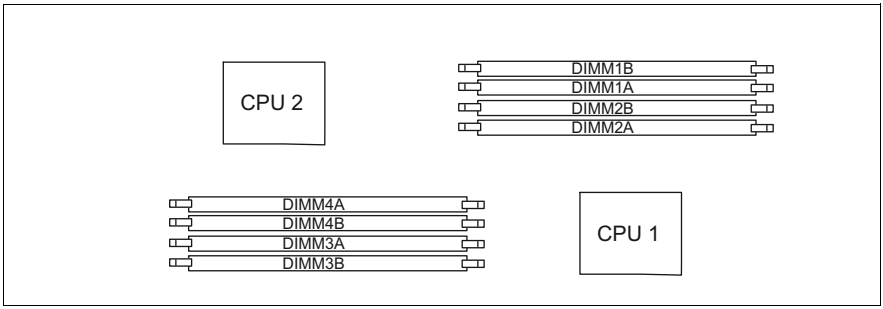

Figure 2: Main memory

– If the memory modules are populated in pairs, each pair must consist of identical memory modules (2-way interleaved mode)

– The module capacity between pairs can differ: pair 2A/2B can be populated with two 1 GMbyte modules and pair 1A/1B with two 2 Gbyte modules.

– CPU 2 must be installed to access DIMM3A/3B and DIMM4A/4B.

Following table shows the mandatory population order:

	DIMM 2A	**DIMM 2B**	**DIMM 1A**	**DIMM 1B**
2 DIMMs	empty	empty	populated	populated
4 DIMMs	populated	populated	populated	populated
	CPU 1			

	DIMM 2A	**DIMM 2B**	**DIMM 1A**	**DIMM 1B**	**DIMM 4A**	**DIMM 4B**	**DIMM 3A**	**DIMM 3B**
4 DIMMs	empty	empty	populated	populated	empty	empty	populated	populated
8 DIMMs	populated	populated	populated	populated	populated	populated	populated	populated
	CPU 1				CPU 2			

3.3 PCI bus

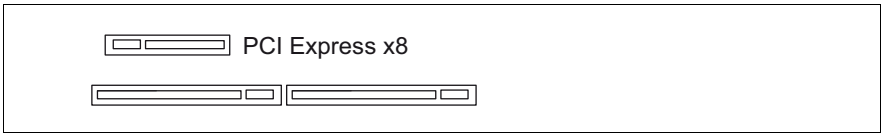

Figure 3: PCI slots

PCI slots

The following table shows an overview of the PCI slots:

PCI slot	**Description**
1	PCI Express x8 slot
2-4	Slots on riser card 1 or 2

Slots on riser card 1:

PCI slot	Description
4	PCI Express x8 slot
3	PCI-X slot (66 MHz)
2	PCI-X slot (66 MHz) inclusive ZCR (option)

Slots on riser card 2:

PCI slot	Description
4	PCI Express x8 slot
3	PCI Express x4 slot
2	PCI-X slot (66 MHz) inclusive ZCR (option)

Zero Channel RAID

PCI-X slot 2 is prepared for the operation of a Zero Channel RAID (ZCR) controller. Such a ZCR controller has no ports for hard disk drives. Installing the ZCR controller in this PCI-X slot upgrades the SAS controller on the system board to a fully featured RAID controller. Without this upgrade the SAS controller on the system board supports only RAID 0 and RAID 1 configurations.

PCI, PCI-X, PCI Express interrupts

Each device connected to a PCI bus, a PCI-X bus or PCI Express can use up to four interrupt signals depending on the functionality.

PCI and PCI-X buses use four lines named INTA to INTD, typically connected to all devices on the bus in order to periodically balance interrupt load. An interrupt signal may thereby be used simultaneously by multiple devices (interrupt sharing).

PCI Express devices send their interrupts through messages. This avoids restrictions in wiring.

The following interrupt signals are used in the system depending on the installed riser card (1 or 2) and the use of a ZCR controller:

With riser card 1:

Slot/device	Property	Interrupt signal
VGA	iRMC graphic	PCI-INTA
LSI 1068	PCI-X SAS controller	PCI-X-INTC
LAN	BCM5715 Dual Channel	
Slot 4	PCIe x8	
Slot 3	PCI-X (66 MHz)	PCI-X-INTD, PCI-X-INTA, PCI-X-INTB, PCI-X-INTC
Slot 2	PCI-X (66 MHz) inclusive ZCR	PCI-X-INTA, PCI-X-INTB, PCI-X-INTC, PCI-X-INTD
Slot 1	PCIe x8	

With riser card 2:

Slot/device	Property	Interrupt signal
VGA	iRMC graphic	PCI-INTA
LSI 1068	PCI-X SAS controller	PCI-X-INTC
LAN	BCM5715 Dual Channel	
Slot 4	PCIe x8	
Slot 3	PCIe x4	
Slot 2	PCI-X (66 MHz) inclusive ZCR	PCI-X-INTA, PCI-X-INTB, PCI-X-INTC, PCI-X-INTD
Slot 1	PCIe x8	

If a ZCR controller has been installed in slot 2, the LSI1068-Controller is hidden in the device list and its interrupt signal goes no longer directly to the system.

Assignment of the PCI interrupts

If you select *Auto* in the BIOS setup, the interrupts are assigned automatically and no further settings are required.

3.4 Screen resolution

Depending on the operating system used the screen resolutions in the following table refer to the Matrox graphic controller on the system board. The Matrox graphic controller is integrated in the iRMC (integrated Remote Management Controller).

Screen resolution	Supported colors
640x480	8 bit, 16 bit, 24 bit
800x600	16 bit, 24 bit
1024x768	16 bit
1152x864	8 bit
1280x1024	8 bit

If you are using an external graphic controller, you will find details of supported screen resolutions in the operating manual or technical manual supplied with the graphic controller.

3.5 Temperature / system monitoring

Temperature and system monitoring aim to reliably protect the computer hardware against damage caused by overheating. In addition, any unnecessary noise is also prevented by reducing the fan speed, and information is provided about the system status.

The temperature and system monitoring is controlled by an onboard controller.

The following functions are supported:

Temperature monitoring

Measurement of the processor temperature, the system board temperature by an onboard sensor and measurement of the ambient temperature by a temperature sensor.

Fan monitoring

Fans that are no longer available, blocked or sticky fans are detected.

Fan control

The fans are controlled according to temperature.

Sensor monitoring

The removal of, or a fault in, a temperature sensor is detected. Should this happen all fans monitored by this sensor run at maximum speed, to achieve the greatest possible protection of the hardware.

Voltage monitoring

The most important voltages are monitored. When a voltage exceeds warning level high or falls below warning level low an alert will be generated. Adequate measurements can be done by running agents.

Cover monitoring

Opening of the cover causes an immediately shutdown of the system.

Unauthorised opening of the cover is detected, even when the system is switched off. However, this will only be indicated when the system is switched on again

System Event Log (SEL)

All monitored events of the system board are recorded in the System Event Log. They could be retrieved after a system reboot via ServerView.

3.6 Connectors and DIP switches

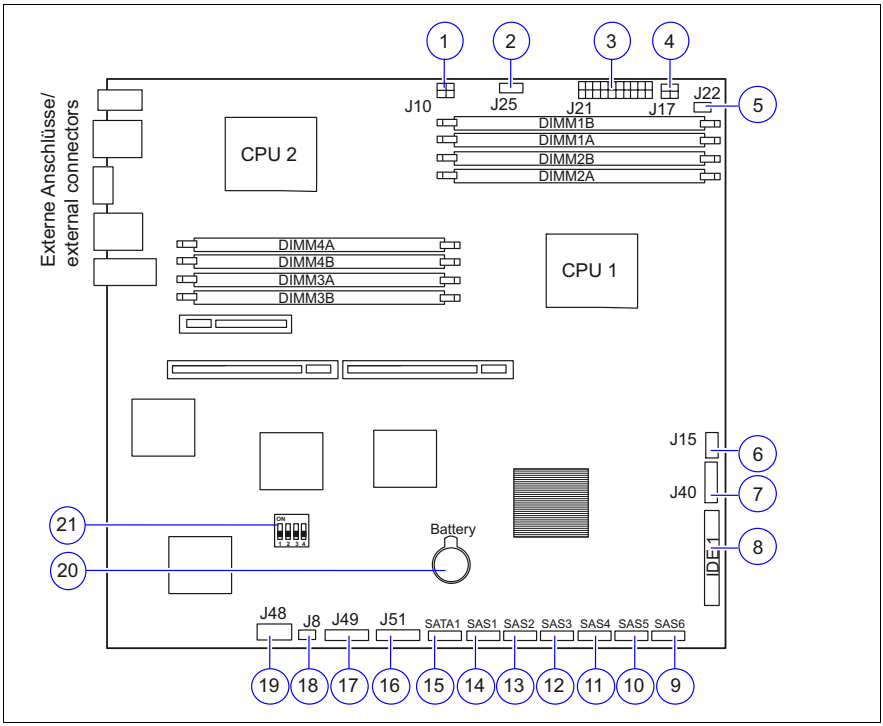

Figure 4: Schematic overview of the system boards D2440/D2932

1 = J10 - power supply CPU 2
2 = J25 - power supply I^2C
3 = J21 - power supply ATX
4 = J17 - power supply CPU 1
5 = J22 - safety switch
6 = J15 - IDTEMP
7 = J40 - fan 1-3 Sys
8 = IDE primary
9 = SAS6
10 = SAS5
11 = SAS4
12 = SAS3
13 = SAS2
14 = SAS1
15 = SATA1
16 = J51 - left backplane
17 = J49 - right backplane
18 = J8 - USB front panel
19 = J48 - LED front panel
20 = battery
21 = DIP switches

Settings with DIP switches

The system board is supplied with all switches set on default position (OFF).

Switch 1

CMOS	OFF	CMOS/RTC settings are not cleared (default)
	ON	CMOS/RTC settings are cleared

Switch 2

BIOS Write Protect	OFF	The System BIOS can be written or deleted. Flash-BIOS update from floppy disk is possible (default).
	ON	The System BIOS can neither be written to nor deleted. Flash-BIOS update from floppy disk is not possible.

Switch 3

Password Skip	OFF	The password query is effective (default).
	ON	The password query is skipped. Passwords are deleted.

Switch 4

Recovery	OFF	The System BIOS is started with the system BIOS from the system board (default).
	ON	The system boots from the „Flash BIOS floppy disk“ and reprograms the system BIOS on the system board.

3.6.1 External connectors

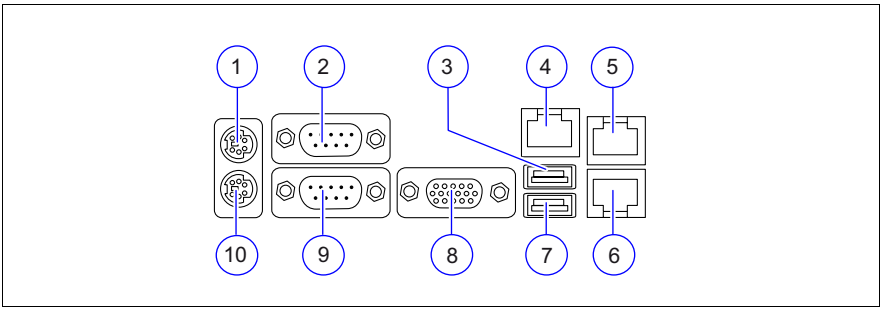

Figure 5: External connectors of the system boards D2440/D2932

1 = PS/2 mouse port
2 = Serial port COM2
3 = USB port 2
4 = LAN port M (Service LAN)
5 = LAN port 2
6 = LAN port 1
7 = USB port
8 = VGA port
9 = Serial port COM1
10 = PS/2 keyboard port

LAN connectors

On this system board you will find a Broadcom 5715 Dual Gbit LAN controller and a Service LAN controller. The Dual Gbit LAN controller supports the transfer rates of 10 Mbit/s, 100 Mbit/s and 1 Gbit/s and supports WOL function through Magic Packet™.

It is also possible to boot a device without its own boot hard disk via LAN. Here PXE and iSCSI protocol is supported.

The LAN controller connectors are equipped with two LEDs (light emitting diode) indicating the transfer rate and the activity.

It is possible to define the LAN port 2 as the Service LAN port and Standard LAN port via BIOS setting. In this case the LAN port M will be deactivated. The LAN port 2 takes over the Service LAN functionality and the standard LAN port in common (virtual LAN requires two different IP addresses).

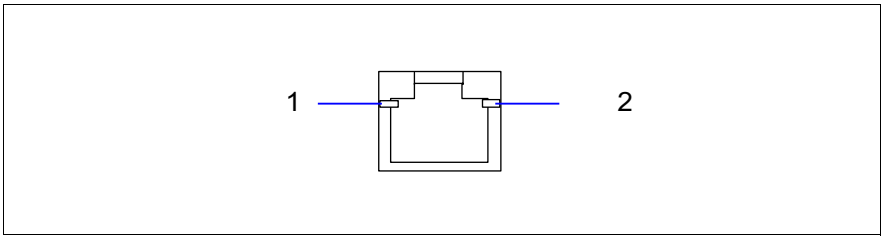

Figure 6: LAN connectors Dual Gbit LAN controller

1	LAN link/activity	green	on	LAN connection
			off	no LAN connection
			flashing	LAN transfer
2	LAN transfer rate	green + yellow	off	transfer rate 10 Mbit/s (or no connection)
		green	on	transfer rate 100 Mbit/s
		yellow	on	transfer rate 1000 Mbit/s

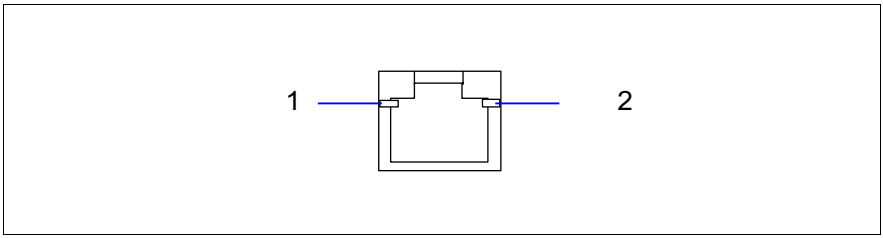

Figure 7: LAN connector Service LAN controller

1	LAN link/activity	green	on	LAN connection
			off	no LAN connection
			flashing	LAN transfer
2	LAN transfer rate	green	off	transfer rate 10 Mbit/s (or no connection)
			on	transfer rate 100 Mbit/s

4 Replacing the lithium battery

In order to save the system information permanently, a lithium battery is installed to provide the CMOS-memory with a current. When the charge is too low or the battery is empty, a corresponding error message is provided. The lithium battery must then be replaced.

CAUTION!

The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer (CR2032).

Do not throw lithium batteries into the trash can. It must be disposed of in accordance with local regulations concerning special waste.

Make sure that you insert the battery the right way round. The plus pole must be on the top!

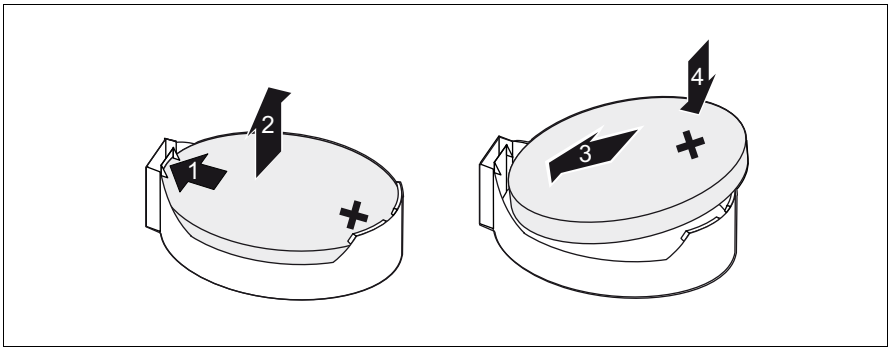

Figure 8: Replacing the lithium battery

- Press the locking spring into direction of the arrow (1), so that the lithium-battery jumps out of its socket.
- Remove the battery (2).
- Insert a new lithium battery of the same type into the socket (3) and (4).

Abbreviations

The technical terms and abbreviations given below represent only a selection of the full list of common technical terms and abbreviations.

Not all technical terms and abbreviations listed here are valid for the described system board.

AC
Alternating Current

ACPI
Advanced Configuration and Power management Interface

ANSI
American National Standards Institute

ASR&R
Automatic Server Recovery and Restart

ATA
Advanced Technology Attachment

BBU
Battery Backup Unit

BIOS
Basic Input Output System

BMC
Baseboard Management Controller

CMOS
Complementary Metal Oxide Semiconductor

COM
COMmunication port

CPU
Central Processing Unit

DDR
Double Data Rate

DIMM
Dual In-line Memory Module

DIP
Dual In-line Package

DMI
Desktop Management Interface

DRAM
Dynamic Random Access Memory

ECC
Error Correction Code

EEPROM
Electrical Erasable Programmable Read Only Memory

EFI
Extensible Firmware Interface

EGB
Elektrostatisch gefährdete Bauteile

EHCI
Enhanced Host Controller Interface

EMI
Electromagnetic interference

EMRL
Embedded RAID Logic

EMV
Elektromagnetische Verträglichkeit (electromagnetic compatibility)

EPROM
Erasable Programmable Read Only Memory

ESD
ElectroStatic Discharge (elektrostatische Entladung)

EVRD
Enterprise VRD

HPC
Hot-plug Controller

FPC
Front Panel Controller

FRU
Field Replaceable Unit

FSB
Front Side Bus

ICE
In Circuit Emulation

IDE
Integrated (intelligent) Drive Electronics

IEC
International Electrotechnical Commission

IME
Integrated Mirroring Enhanced

IOOP
Intelligent Organisation Of PCI

IPMB
Intelligent Platform Management Bus

IPMI
Intelligent Platform Management Interface

iRMC
integrated Remote Management Controller

ISO
International Organisation for Standardisation

LAN
Local Area Network

LED
Light Emitting Diode

MPS
Multi Processor Specification

NMI
Non Maskable Interrupt

OEM
Original Equipment Manufacturer

OHCI
Open Host Controller Interface

OS
Operating System

PCI
Peripheral Components Interconnect

PDA
Prefailure Detection and Analyzing

PIO
Programmed Input Output

PDB
Power Distribution Board

PLD
Programmable Logic Device

PS(U)
Power Supply (Unit)

PWM
Pulse Wide Modulation

PXE
Preboot eXecution Environment

RAID
Redundant Array of Inexpensive Disks

RoHS
Restriction of the Use of Certain Hazardous Substances (Waste from Electric and Electronic Equipment, EU Directive)

RoMB
RAID on Motherboard

RSB
Remote Service Board

RST
ReSeT

RTC
Real Time Clock

SAS
Serial Attached SCSI

SATA
Serial ATA

SCSI
Small Computer Systems Interface

SDDC
Single Device Data Correction

SDRAM
Synchronous Dynamic Random Access Memory

SEL
System Event Log

SHDG
Server Hardware Design Guide

SMB
System Management Bus

SMM
Server Management Mode

SMP
Symmetrical Multi Processing

UHCI
Unified Host Controller Interface

USB
Universal Serial Bus

VGA
Video Graphics Adapter

VRD
Voltage Regulator Down

VRM
Voltage Regulator Module

WEEE
Waste from Electric and Electronic Equipment (EU Directive)

WfM
Wired for Management

WOL
Wake up On LAN